General Electric Advanced Technology Manual

Chapter 3.0

Technical Specifications

TABLE OF CONTENTS

LIST OF TABLES

3.0 TECHNICAL SPECIFICATION ORGANIZATION

Learning Objectives:

1. State the purpose of Technical Specifications

2. State the purpose of Specification 3.0.3.

3.0.1 Introduction

The purpose of Technical Specification is to protect the health and safety of the public by imposing limits, operating conditions, and other similar requirements on the facility.

The legal requirements for plant technical specifications are found in 10 CFR 50.36 which states "The technical specifications will be derived from the analyses and evaluation included in the safety analysis report...." Paraphrasing this statement, technical specifications define the limits of plant operation to ensure that the plant is operated within those boundaries established by the Safety Analysis. For example, if the safety analysis uses a maximum reactor coolant system pressure of 1325 psig then a technical specification limit of 1325 psig will be imposed. After the plant's technical specifications have been approved by the Commission, they become part of the licensing document.

3.0.2 Derivation

The format for technical specifications evolves from 10 CFR 50.36 which lists the following categories to be included in technical specifications:

- Safety limits and limiting safety system settings,
- Limiting conditions for operation,
- Surveillance requirements,
- Design features, and
- Administrative controls.

For special items of interest, the NRC issues Regulatory Guides which describe methods acceptable to the NRC staff of implementing specific parts of regulations. One such Regulatory Guide (1.70) provides the STANDARD format and content of Safety Analysis Reports (SARs). This guide specifies seventeen chapters in the SAR, and assigns technical specifications to Chapter 16. Portions of this Regulatory Guide dealing with technical specifications are included below.

3.0.3 Format

There are three technical specification formats that are currently being used. The oldest of these formats is called "custom" technical specifications because the format that was used was decided by the utility. Table 3.0-1 illustrates a typical "custom" specification for chemistry. The specification is actually a limiting condition for operation. A limiting condition for operation is defined as a requirement that must be satisfied for the unrestricted operation of the unit. The statements that follow the limiting condition for operation (LCO) are actions that must be taken in the event that the LCO cannot be satisfied. Note that the actions of these statements require a plant shutdown if the LCO cannot be reestablished. The bases for the specification follow the limiting condition for operation and its associated action statements. The surveillance, to ensure that the LCO is satisfied, is located in the right hand column across from the LCO.

In the mid seventies, the format for technical specifications was changed to a “standard” format. This format is shown in Table 3.0-2. The standard technical specifications format starts with the LCO statement. Again, the LCO must be satisfied for unrestricted operation. The action statements, i.e., the required actions that must be taken if the condition of the LCO cannot be satisfied, are listed next. The surveillance requirements follow the action statements. Bases for a particular specification are in separate sections of the document.

The third version of technical specifications, NUREG-1433, Revision 1, was issued in April of 1995 and incorporates the cumulative changes resulting from the experience gained from license amendment applications. Many licensees have or plan to convert to these improved Standard Technical Specifications (STS) or to adopt partial improvements to existing technical specifications. NUREG-1433 was the result of extensive public technical meetings and discussions between the Nuclear Regulatory Commission staff and various nuclear power plant licensees, Nuclear Steam Supply System (NSSS) Owners Groups, specifically the GE Owners Group, NSSS vendors, and the Nuclear Energy Institute. The improved STS were developed based on the criteria in the Final Commission Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors, dated July 22, 1993. Licensees are encouraged to upgrade their technical specifications consistent with those criteria and conforming, to the extent practical and consistent with the licensing basis for the facility, to Revision 1 to the improved STS. The Commission continues to place the highest priority on requests for complete conversions to improved STS. Licensees adopting portions of the improved STS to existing technical specifications should adopt all related requirements, as applicable, to achieve a high degree of standardization and consistency.

The new improved STS consist of three volumes:

- Technical Specifications,
- Bases, and
- Technical Requirements Manual

The technical specifications volume, illustrated in Table 3.0-3, begins with the LCO followed by the applicability, action, and surveillance sections. The actions sections are divided into three columns (condition, required action, and completion time) while the surveillance sections are divided into two sections (surveillance and frequency). This format is provided to better articulate to the operator the conditions that exist and what must be performed for that condition.

3.0.4 New Revised Standard Technical Specifications

The description that follows is based on the new revised standard technical specification format (the third format discussed above) and will be used in the Advanced Technology and Simulator Courses.

3.0.4.1 Use and Application

This section of technical specifications manual is comprised of four subsections:

- Definitions
- Logical Connectors
- Completion Times
- Frequency

Subsection 1.1 provides defined terms that appear in capitalized type and are applicable throughout technical specifications and bases.

The Logical Connectors, subsection 1.2, explains the meaning of logical connectors and provides examples to illustrate their usage.

The Completion Time, subsection 1.3, establishes the completion time and provides guidance for its use.

The Frequency, subsection 1.4, defines the proper use and application of frequency requirements.

3.0.4.2 Safety Limits

This section of the plant technical specifications establishes the requirements for the protection of the fission product barriers. These requirements are called safety limits. For BWRs, the safety limits are:

- ***Thermal Power***, Low Pressure or Low Flow
- ***Thermal Power***, High Pressure and High Flow
- Reactor Coolant Pressure
- Reactor Vessel Water Level

When these limits are satisfied, then the fuel cladding and reactor coolant system pressure boundaries are protected during anticipated operational occurrences.

3.0.4.3 LCOs and Surveillance Requirements

Sections 3.0/4.0 are used to establish the ground rules for the remaining portions of technical specifications. One of the most important specifications in this section is 3.0.3, the "motherhood" statement. This specification provides guidance for plant operation when the LCO and its associated action statements cannot be satisfied. For example, one of the ECCS LCOs requires two trains of low pressure systems to be operable. If one train is out of service, operation may continue for some time period. However, if both trains are out of service the actions of specification 3.0.3 must be taken. In summary, when the plant is less conservative than the least conservative technical specification action statement, go to specification 3.0.3. In addition to providing guidance for plant operation in unusual conditions, sections 3.0 also endorses ASME section XI as the testing document for power plant pumps and valves.

The remaining parts of 3/4 specifications deal with individual systems. The following is a listing of the sections or categories and their associated systems:

- 3.1 Reactivity Control Systems
- 3.2 Power Distribution Limits
- 3.3 Instrumentation
- 3.4 Reactor Coolant System
- 3.5 Emergency Core Cooling System
- 3.6 Containment Systems
- 3.7 Plant Systems
- 3.8 Electrical Power Systems
- 3.9 Refueling Operations
- 3.10 Special Operations

3.0.4.4 Design Features

Section 4.0 describes the important design features of the unit. Items such as the cyclic limits of the reactor coolant system and it associated components are listed here. In addition, the emergency plan exclusion and low population areas are shown in this section.

3.0.4.5 Administrative Controls

Administrative controls delineate the management and staff organization, review and audit groups, record and reporting requirements, and procedures required to assure safe plant operation. The administrative organization is addressed in terms of offsite management and onsite staff requirements including the minimum shift crew composition for all plant conditions. The review of safety related matters is conducted by Plant Review Board and the Safety Review Board. Although these are separate groups, they function together in the review and submittal of reports concerning safety matters.

The General Manager shall provide direct executive oversite over all aspects of the plant. The Assistant General Manager-Plant Operations shall be responsible for overall unit operation. Offsite and onsite organizations, in addition to shift manning, are established per administrative control section 6.2.

3.0.5 Bases

The bases for technical specifications requirements is found in a separate BASES manual

3.0.6 Technical Requirements Manual

The Technical Requirements Manual (TRM) contains specifications and operational conveniences, such as lists, cross references, acceptance criteria, and drawings. TRM specifications are contained in Section 3.0 and include operational requirements, surveillance, and required actions for inoperable equipment. Instructions for the use and application of TRM specifications are included at the beginning of Section 3.0

Operational conveniences provide a ready reference to setpoints, lists, and other helpful tools described in plant procedures and programs.

Other plant documents, such as Fire Hazards Analysis, Appendix B, Core Operating Limits Report (COLR), and Offsite Dose Calculation Manual, are not considered part of the TRM, but are included with the TRM as Appendices and either contain their own rules of usage or are covered by plant documents.

Core Operating Limits Report

Many of the limits discussed in this section must be revised for every core reload cycle. to make a change, a license amendment is required, which must be reviewed by an onsite safety review board and the NRC. This makes any change to these limits a large administrative burden.

NRC Generic Letter 88-16, "Removal of Cycle-Specific Parameter Limits for Technical Specifications," dated October 4, 1988, provided guidance for relocating certain cycle dependent core operating limits from Technical Specifications to a Core Operating Limits Report (COLR). The COLR will still be reviewed, but not as a license amendment. Typical core operating limits include the following:

- Control Rod Program Controls
- Average Planar Linear Heat Generation Rate
- Minimum Critical Power Ratio
- Linear Heat Generation Rate

In addition, an entry is added to the definitions to define COLR, and the administrative technical specifications are modified to show the COLR as part of the reporting requirements.

3.0.7 Probability Risk Assessment

Probability Risk Assessment (PRA) of a nuclear power plant provides a tool to quantitatively evaluate the risk implications of Technical Specification (TS) requirements and the risk impact of changes in these requirements. Use of a PRA to evaluate or assess TS requirements and study their modifications is called PRA Informed TS evaluation. Such evaluations are used along with a broad spectrum of considerations which include deterministic analyses, knowledge of lessons learned from operating experiences, and engineering judgments to define or alter TS requirements. When a modification to TS is analyzed using PRA and submitted to the regulatory authority for approval, it is commonly referred to as a PRA-Based or Risk Informed TS submittal. The review and acceptance of the requested modification in the submittal by the regulatory authority constitutes a change in the plant TS.

Assessing the risk impact of a TS change is a useful input in analyzing, reviewing, and accepting the change. Risk-Informed TS submittal evaluations have primarily focused on limiting conditions for operations LCOs) and surveillance requirements. Specifically, PRA-Informed evaluations can be used to address:

- LCO - Identify or define the condition for which a requirement should be defined.
- LCO - Rethink allowed outage time.
- LCO - Determine the required action, i.e., the need for shutdown, additional testing or operability requirements.

PRA-Informed TS submittals primarily deal with permanent changes to TS requirements. The majority of the submittals are motivated to avoid a mode change (plant shutdown).

3.0.8 Exercise

According to technical specifications, when is a recirculation loop considered in operation?

Table 3.0-1

Custom Technical Specifications

Limiting Conditions for Operation	Surveillance Requirements
3.6 Primary System Boundary	4.6 Primary System Boundary
B. Coolant chemistry.	
1. Prior to startup and at steaming rates less than 100,000 lb/hr, the following limits shall apply. a. Conductivity, 2.0 μmoho/cm @ 25°F. b. Chloride, 0.1ppm	1. A sample of reactor coolant shall be analyzed: a. At least every 96 hours for conductivity and chloride ion content. b. At least every 24 hours during startups, until the steaming rate is greater than 100,000 lb/hr, for conductivity and chloride ion content. c. At least every 8 hours for conductivity and chloride content when the continuous conductivity monitor is inoperable.
2. At steaming rates greater than 100,000 lb/hr, the following limits apply. a. Conductivity, 2.0 μmho/cm @ 25°F. b. Chloride, 0.2 ppm	2. During startup prior to pressurizing the reactor above atmospheric pressure, measurements of reactor water quality shall be performed to show conformance with 3.6.B.1 of limiting conditions.

Table 3.0-2

Standard Technical Specifications

Reactor Coolant System

3/4.4.4 Chemistry

Limiting Condition for Operation

3.4.4 The chemistry of the reactor coolant system shall be maintained within the limits specified in Table 3.4.4-1

Applicability: At all times.

Action:

a. In OPERATIONAL CONDITION 1

1. With the conductivity, chloride concentration or pH exceeding the limit specified in Table 3.4.4-1 for less than 72 hours during one continuous time interval and, for conductivity and chloride concentration, for less than 336 hours per year, but with the conductivity less than 10 μmho/cm at 25 ^{o}C and with the chloride concentration less than 0.5 ppm, this need not be reported to the Commission and the provisions of Specification 3.0.4 are not applicable.

2. With the conductivity, chloride concentration or pH exceeding the limit specified in Table 3.4.4-1 for more than 72 hours during one continuous time interval or with the conductivity and chloride concentration exceeding the limit specified in Table 3.4.4-1 for more than 336 hours per year, be in at least STARTUP within the next 6 hours.

3. With the conductivity exceeding 10 μmho/cm at 25 ^{o}C or chloride concentration exceeding 0.5 ppm, be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. In OPERATIONAL CONDITION 2 and 3, with the conductivity, chloride concentration or pH exceeding the limit specified in Table 3.4.4-1 for more than 48 hours during one continuous time interval, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

c. At all other times:

1. With the:

a) Conductivity or pH exceeding the limit specified in Table 3.4.4-1, restore the conductivity and pH to within the limit within 72 hours, or

b) Chloride concentration exceeding the limit specified in Table 3.4.4-1, restore the chloride concentration to within the limit within 24 hours, or

c) Perform an engineering evaluation to determine the effects of the out-of-limit condition on the structural integrity of the reactor coolant system. Determine that the structural integrity of the reactor coolant system remains acceptable for continued operation prior to proceeding to OPERATIONAL CONDITION 3.

2. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.4.4 The reactor coolant shall be determined to be within the specified chemistry limit by:

a. Measurement prior to pressurizing the reactor during each startup, if not performed within the previous 72 hours.

b. Analyzing a sample of the reactor coolant for:

1. chlorides at least once per:

a) 72 hours, and

b) 8 hours whenever conductivity is greater than the limit in Table 3.4.4-1.

c. Continuously recording the conductivity of the reactor coolant, or, when the continuous recording conductivity monitor is inoperable, obtaining an inline conductivity measurement at least once per:

1. 4 hours in OPERATIONAL CONDITIONS 1, and 3, and

2. 24 hours at all other times.

d. Performance of a CHANNEL CHECK of the continuous conductivity monitor with an in-line flow cell at least once per:

1. 7 days, and

2. 24 hours whenever conductivity is greater than the limit in Table 3.4.4-1.

Table 3.0-3
Improved Standard Technical Specifications

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING (RCIS) SYSTEM

3.5.1 ECCS - Operating

LCO 3.5.1 Each ECCS injection/spray subsystem and the Automatic Depressurization System (ADS) function of seven safety/relief valves shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3, except high pressure coolant injection (HPCI) and ADS valves are not required to be OPERABLE with reactor steam dome pressure $\leq$ 150 psig.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One low pressure ECCS injection/spray subsystem inoperable.	A.1 Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	7 days
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	12 hours 36 hours
C. HPCI System inoperable.	C.1 Verify by administrative means RCIC System is OPERABLE. AND C.2 Restore HPCI System to OPERABLE status.	1 hour 14 days

(Continued)